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(71) Applicant: BLUE RIDGE PAPER PRODUCTS, INC. [US/US]; 1329 Howell Mill Road, Waynesville, NC 28786 (US).

(72) Inventors: WRIGHT, Robert, V.; 2 Sundance Lane, Arden, NC 28704 (US). CURTIS, James, F.; Route 2, P.O. Box 125, Clyde, NC 28721 (US).

(74) Agents: MULLINAX, J., Bennett et al.; Dority & Manning, P.O. Box 1449, Greenville, SC 29602–1449 (US).

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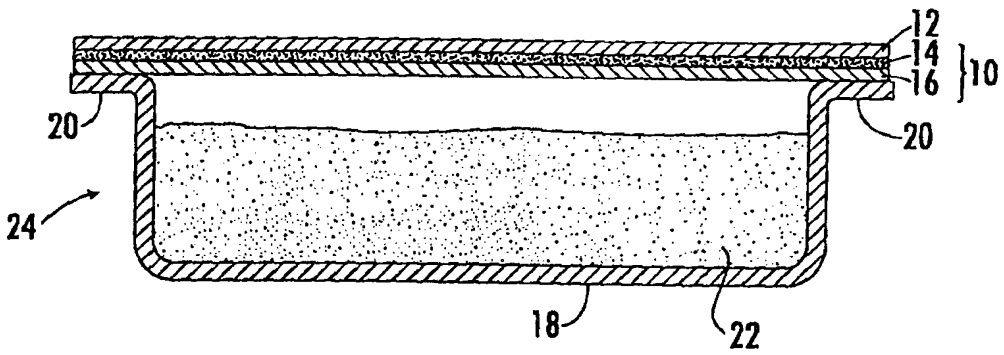
(54) Title: OVEN RELEASE FOOD PACKAGING



(57) Abstract

The instant invention pertains to packaging which is suitable for protecting food during handling and storage and which also facilitates optimal heating and service of the food contained therein. In particular, a container (24) having a recessed area surrounded by a sealing rim (20), and a multilayer lid (10) that comprises a base layer (12), an optional barrier layer (14), and an adhesive layer (16), are described. The lid (10) is heat sealed to the top edge of the container which contains food (21) to form a food package (24) that may be frozen and that withstands shipping and distribution handling without the need for a protective outer folding carton. Such lids provide automatic venting when heated in a microwave or conventional oven and are easily separated from the container after heating. Unlike present lids which are difficult to remove and leave tears and unsightly exposed paper fibers which may absorb gravies and sauces, the instant lid is easily removed and results in a more esthetically pleasing package.

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OVEN RELEASE FOOD PACKAGING

The instant disclosure relates to packaging which is suitable for protecting food products during handling, storage and shipment, and which also facilitates heating and service of the food contained therein. In particular, the instant disclosure relates to a package including a multilayer lid which may be heat sealed to the top edge of a container.

BACKGROUND OF THE INVENTION

Commercially prepared food products are often placed in disposable packaging for distribution to consumers. Certain packaged food products, commonly referred to as frozen entrees, are typically stored at freezing or room temperatures and may be reconstituted by heating the package in a microwave or conventional radiant oven. The food product may be consumed directly from the disposable package, thus eliminating the need for serving dishes which require washing.

Various configurations exist for such packaging. For example, one type of packaging includes a container, such as a polyethylene terephthalate ("PET") coated ovenable paperboard tray, which is filled with a food product and covered with a film material, such as Mylar®, sealed to the top flange of the container. Unfortunately, the resulting package is not rugged enough to withstand conditions associated with shipping and handling and must be enclosed within an outer carton. This increases the amount of materials required as well as the total expense of the packaging. A number of such cartons are placed into a corrugated shipping container which is palletized for shipment to distribution centers.

Another packaging that is growing in popularity includes a paperboard lid which is heat sealed onto a container filled with a food product. These packages may be placed directly into corrugated shipping containers ready for distribution. Unfortunately, it is difficult to remove a paperboard lid that is attached securely enough to protect the package during distribution. The lid and the container may become torn, rendering the product unattractive to consumers. Lid removal is further complicated by the fact that the package and its contents are usually steaming hot, having been heated in an oven. These problems have been partially addressed by adding a half cut score around the lid that is being sealed for controlling the release of the lid. However, this results in an unsightly border of raw paper fibers around the top of the container flange which readily absorbs gravies and sauces from the entree during reconstitution and looks unattractive.

Although the above described packaging systems are adequate for storing and reheating food, a need continues to exist for an improved food packaging that uses less materials and adequately protects the product against damage caused by shock and vibration during shipping and distribution. A need also continues to exist for improved food packaging that is easily opened by consumers and presents an attractive appearance.

BRIEF SUMMARY OF THE INVENTION

One embodiment of the instant disclosure pertains to a food package comprising a container having a recessed area for receipt of the food which is surrounded by a sealing rim, and a lid comprising a base layer and an adhesive layer, the adhesive layer being capable of heat sealing to the sealing rim of the container, maintaining a seal with the sealing rim of the container at temperatures below heating temperatures, and releasing the seal when subjected to heating temperatures.

Another embodiment of the instant disclosure pertains to a lid comprising a base layer and an adhesive layer, the adhesive layer being capable of heat sealing to the sealing rim of a container, maintaining a seal with the sealing rim of the container at temperatures below heating temperatures, and releasing the seal when subjected to heating temperatures. Alternative lid embodiments optionally include a third, intermediate barrier layer which may advantageously enhance the strength and rigidity of the food package.

The food package and lid systems of the instant disclosure advantageously exhibit sufficient strength and stability so as to obviate the need for surrounding packaging (beyond standard corrugated shipping containers) during shipping and distribution. The strength and stability afforded by the food package and lid systems of the instant disclosure thus contribute to the efficiency in the packaging process and reduce both cost and waste generally associated with food packaging systems.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 depicts an embodiment of an oven release food packaging according to the instant disclosure; and

FIGURE 2 depicts an embodiment of a lid, which includes a base layer, a barrier layer, and an adhesive layer, according to the instant disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The instant oven release packaging generally includes a container and a multilayer lid heat sealed thereto. The food contents of the packaging may be frozen to achieve the desired level of food preservation. Once frozen, the packaging of the instant disclosure exhibits sufficient strength and integrity to withstand shipping, distribution and handling without the need for a protective outer carton. The oven release packaging also provides for automatic venting of the packaging when heated in a microwave or conventional oven and allows for easy removal of the lid from the container after heating. Tearing of the package during lid removal is kept to a minimum, thereby resulting in a more esthetically pleasing serving container. The instant oven release packaging is also easier to manufacture than present packaging systems, uses less materials and energy, and is therefore less costly to produce.

As shown in Figure 1, a food packaging 24 according to the present disclosure includes a lid 10 and a food container 18. As shown in Figure 1 and more specifically in Figure 2, the lid 10 includes a base layer 12, an optional barrier layer 14, and an adhesive layer 16. The base layer 12 may be selected from suitable materials known in the food packaging industry, such as paper, paperboard, resinous materials (e.g., plastics), metal, or any combination of these materials. In a preferred embodiment of the instant disclosure, the base layer 12 is comprised of 0.019 inch caliper milk carton base stock available from Champion International Corporation (Stamford, CT). Clay coated SBS ("solid bleached sulfate") board, such as 18 point SBS clay coated board available from Georgia Pacific Corporation, is preferred when high quality graphics are required and a clay print surface is needed.

The optional barrier layer 14 may be extruded onto the base layer 12 and, when present, typically provides a grease and moisture barrier. The barrier layer 14 may also provide strength and rigidity to the container package during shipping and help to prevent damage or tearing which may occur when the lid is removed. The barrier layer 14 may be metal foil, filled or unfilled polyethylene terephthalate (PET), polybutylene terephthalate (PBT), ethylene vinyl alcohol (EVOH), polyethylene, polypropylene, nylon, metal foils, acrylonitrile-butadiene-styrene (ABS), polycarbonate, acrylonitrile copolymers, polystyrenes, and polyvinyl chloride. In a preferred embodiment, the barrier layer 14 is comprised of PET, such as 7807 PET available from Shell Chemical Company.

The barrier layer 14 may be extruded onto the base layer 12 using conventional extrusion technology and is typically added at a level to provide the desired functional properties, e.g.,

suitable grease and/or moisture resistance. In a preferred embodiment, the barrier layer 14 is PET extruded onto the base layer 12 in an amount of about 20 pounds per 3000 square feet.

In general, the adhesive layer 16 is extruded onto the barrier layer 14 (when present) or the base layer 12, and is capable of being heat sealed to the sealing rim 20 of a food container 18 to create a food package 24. The adhesive layer 16 maintains the bond between the sealing rim 20 of the food container 18 and the barrier layer 14 at temperatures below heating temperatures. By "heating temperature" is meant the usual oven (whether conventional or microwave) temperature(s) customarily utilized to heat frozen food, e.g., a TV dinner, to a serving temperature. In particular, the adhesive layer 16 will typically maintain a bond between the sealing rim 20 of the food container 18 and the barrier layer 14 (when present) or base layer 12 in a temperature range of between about -40 °F to about 150 °F. When the food package 24 is heated in a microwave or conventional oven to a heating temperature, the adhesive layer 16 softens, allowing the food package 24 to self-vent, e.g., automatically release steam from within the package 24. In addition, once the package 24 reaches a heating temperature, the lid 10 may be easily and effectively removed from the food container 18 by the user, i.e., with ease and without tearing the lid 10.

The adhesive layer 16 is selected from a material that will bond and release in the temperature ranges described hereinabove. Preferred materials for use in adhesive layer 16 include acrylate polymers, copolymers and mixtures thereof, and particularly ethyl methyl acrylate ("EMA"), a blend of EMA with maleic anhydride, acid modified EMA, EMA blended with acid modified ethylene acrylate, ethylene-butyl-acrylate copolymer, or modified polyethylenes. In a preferred embodiment of the present disclosure, the adhesive layer 16 is EMA blended with acid-modified ethylene acrylate, and particularly a blend of 80% Chevron 2261 EMA available from Chevron Chemical Co. (Orange, Texas) and 20% of DuPont 2014 acid-modified ethylene acrylate available from DuPont (Wilmington, Delaware), or a blend of 80% Chevron 2207 EMA, and 20% of DuPont Bynel 2014 acid-modified ethylene acrylate. Additionally preferred adhesive materials are prepared by blending EMA (e.g., Chevron 2207) with acid-modified ethylene acrylate (e.g., Bynel 2014) at varying weight ratios, depending on the precise adhesive properties desired. The preferred materials described herein have exhibited superior "cold tack" properties as compared to an adhesive layer of EMA alone. The term "cold tack" refers to the adhesive performance of materials at temperatures below room temperature, in particular, temperatures at or below freezing. For example, such temperatures include those temperatures at which frozen foods are customarily stored.

The adhesive layer 16 may be extruded onto the barrier layer 14 (when present) or the base layer 12 utilizing conventional extrusion equipment, and at in an amount to achieve the desired adhesion to the food container 18. In a preferred embodiment of the present disclosure, the adhesive layer 16 is extruded onto the barrier layer 14 in an amount of 8 pounds per 3000 square feet.

The lid material may be produced in rolls, commonly referred to as "roll stock," which may then be cut to specific dimensions to fit a particular tray. Figure 2 depicts one embodiment of a lid which has been cut from roll stock. Paperboard serves as the base layer 12. Extruded onto the base layer 12 is a barrier layer 14 of 20 pounds per 3000 square feet of polyethylene terephthalate (PET), which provides, *inter alia.*, protection from grease and moisture. Extruded onto the barrier layer 14 is an adhesive layer 16 of 8 pounds per 3000 square feet of methyl ethyl acrylate (MEA). Adhesive layer 16 adheres lid 10 to container 18 during storage, shipping and handling, and automatically separates the lid 10 from the container 18 at heating temperatures.

As shown in Figure 1, the lid of the instant disclosure may be used to seal a container 18 having a recessed area 22 surrounded by a sealing rim 20. In a preferred embodiment, the container 18 is fabricated from conventional materials used in the food industry which provide appropriate dimensional stability, e.g., when subjected to heat, and are inert with respect to the food to be packaged therein. For example, container 18 may be fabricated from materials such as paperboard, metal, plastics, and various laminates.

In addition to the above described base, barrier, and adhesive layers, the instant lid may also comprise further layers to provide additional properties to the lid, e.g., extra strength if desired for a particular application. The method of application of the above coatings to the base layer may be by extrusion coating or coextrusion coating (where more than one different coating is applied through one extrusion die), or by lamination of the coatings using an extrusion lamination adhesive or tie coat.

In use, a food product is typically deposited into the recessed area 22 of the food container 18 and a lid 10 is then sealed to the sealing rim 20 by the simultaneous application of heat and pressure in the area of the seal. The resulting food package 24 is functional during storage and distribution of the food product contained in the package over a temperature range of -40 to +150 degrees Fahrenheit. In particular, the food package 24 advantageously exhibits sufficient strength and stability to obviate the need for a further carton or protective package. Notwithstanding the strength and stability exhibited by food package 24, when placed in a microwave or conventional oven, such as for the reconstitution or warming of frozen foods to a

serving temperature, the lid's extruded adhesive coating automatically releases the lid 10 from the container 18. This automatic release permits venting of vapors generated within the package during heating and facilitates lid removal for consumption of the food contents.

Thus, the lid of the present disclosure exhibits numerous advantages over conventional flexible lid materials which are often difficult to remove from containers after reconstitution of entrees during preparation for serving. In addition, flexible lid materials contribute little structural rigidity to the food package, particularly when contrasted with the lid of the present disclosure, and such flexible lids general require an outer carton to protect the integrity of the food package during subsequent handling. Because the instant lid eliminates the need for a protective outer carton, less materials are required.

EXAMPLES

Example 1

Ten pounds per 3000 square feet of Chevron 2207 EMA is extrusion coated onto 0.017 inch caliper milk carton stock. The EMA coated board is cut into lids and heat sealed to ovenboard trays using a Sentinel heat sealer at 400° F with a dwell time of 1.5 seconds. A small flap is cut into the tray lid, 60 ml of water is added, and the flap closed. Trays are placed in a microwave oven for four minutes at a 10 setting, and the lid is easily removed from the package thereafter. The lids are also easily removed from comparable trays heated in a conventional radiant oven at 375° F for 30 minutes. Similar results are obtained from tests using lids made of 0.017 inch caliper milk carton stock extrusion coated with 15 pounds per 3000 square feet of Chevron 2207 EMA.

Example 2

Chevron 2268 EMA is extrusion coated onto the non-clay side of 18 point SBS clay-coated board available from Georgia Pacific at about eight pounds per 3000 square feet. The EMA coated board is cut into lids which are heat sealed to PET coated trays using a Sentinel heat sealer at 500° F, with a dwell time of 2 seconds and air pressure gauge setting of 60 psig. A slit is cut in the lid to allow the tray to be half filled with water. The contents of the trays are then frozen. The frozen trays containing ice are dropped from waist height onto the floor. No damage results when the tray is dropped to land on its base. The lids are easily removed, generally without fiber tear, when trays are heated in a microwave until the water boils.

Example 3

Ten pounds per 3000 square feet of DuPont 8111 PET and 5 pounds per 3000 square feet of Chevron 2207 EMA are coextruded onto 0.019 inch caliper Champion milk carton base stock. A layer of PET is coated onto the paperboard and a layer of EMA coated onto the PET layer. Lids cut to fit ovenboard trays are heat sealed to trays using a Sentinel heat sealer at 400° F with a dwell time of 1.5 seconds. A small flap is cut into the tray lid, 60 ml of water is added, and the flap closed. Trays are placed in a microwave oven for four minutes at a 10 setting. The lids are easily removed. Comparable trays are also placed in a conventional radiant oven at 375° F for 30 minutes and the lids are easily removed.

Example 4

Traytuf 7087 PET produced by Shell Chemical Company and Chevron 2268 EMA are coextruded onto the non-clay side of 18 point Georgia Pacific SBS paperboard. The PET is extruded next to the board with the EMA on the outside surface to provide a heat seal to PET coated ovenboard trays. Lids formed from the PET/EMA coextruded board show excellent performance with respect to microwave oven release from trays containing frozen lasagna. Release in a conventional radiant oven is also excellent. Besides preventing the intrusion of grease through the paperboard, the PET layer reinforces the lid structure and prevents tearing of the paperboard during removal of the lid from the tray after reconstitution.

Example 5

The following release coatings are coextruded onto 0.0135 paperboard:

1) Shell Chemical Co. Traytuf 7087 PET, 20 lbs per 3000 Sq. Ft. is coextruded with 8 lbs per 3000 Sq. Ft. of Chevron 2261 EMA on the outside.

2) Shell Chemical Co. Traytuf 7087 PET, 20 lbs per 3000 Sq. Ft. is coextruded with 8 lbs per 3000 Sq. Ft. of Chevron 2207 EMA, on the outside.

3) Shell Chemical Co. Traytuf 7087 PET, 20 lbs per 3000 Sq. Ft., is coextruded with 8 lbs per 3000 Sq. Ft. of a blend of 80% Chevron 2261 EMA and 20% of DuPont 2014 acid-modified ethylene acrylate.

4) Shell Chemical Co. Traytuf 7087 PET, 20 lbs per 3000 Sq. Ft., is coextruded with 8 lbs per 3000 Sq. Ft. of a blend of 80% Chevron 2207 EMA, and 20% of DuPont 2014 acid-modified ethylene acrylate.

Evaluations are conducted on the cold tack of the PET coextrusions with the Chevron EMA 2261 and EMA 2207 blends with DuPont 2014 acid-modified ethylene acrylate. Comparisons are made to the PET coextrusion with Chevron EMA 2261, 2260, 2268 and 2207 without the DuPont 2014 added. Lids are sealed onto trays and a closeable flap cut in the lid. Water is added to the tray which is placed in a freezer overnight. The trays are removed and dropped on their long edge from waist height. Seals remained intact on lids using the EMA 2261 and 2207 blends with DuPont 2014, indicated superior cold tack for these adhesives. The lid seals without the DuPont 2014 failed under the same conditions.

Although the particular embodiments shown and described above will prove useful in many applications relating to the arts to which the instant disclosure pertains, further modifications of the present invention herein disclosed will occur to persons skilled in the art. All such modifications are deemed to be within the scope and spirit of the present invention as defined by the appended claims.

CLAIMS

What is claimed is:

1. A food package comprising

   (a) a container having a recessed area surrounded by a sealing rim, and

   (b) a lid comprising a base layer and an adhesive layer, the adhesive layer being capable of heat sealing to the sealing rim of the container, maintaining a seal with the sealing rim of the container at temperatures below heating temperatures, and releasing the seal when subjected to heating temperatures.

2. The food package according to Claim 1, wherein the adhesive layer of the lid is sealed to the sealing rim of the container.

3. The food package according to Claim 1, wherein the base layer comprises a material selected from the group consisting of paper, paperboard, plastic, metal, and combinations thereof.

4. The food package according to Claim 1, wherein the adhesive layer is capable of maintaining a seal with the sealing rim of the container at a temperature range from at least about -40 °F to about +150 °F.

5. The food package according to Claim 1, wherein the adhesive layer contains an adhesive selected from the group consisting of ethyl methyl acrylate, ethyl methyl acrylate with maleic anhydride, acid modified ethyl methyl acrylate, ethyl methyl acrylate with acid modified ethylene acrylate, ethylene-butyl-acrylate copolymer, modified polyethylene, and mixtures thereof.

6. The food package according to Claim 5, wherein the adhesive comprises EMA blended with acid-modified ethylene acrylate.

7. The food package according to Claim 6, wherein the adhesive comprises 80% EMA blended with 20% acid-modified ethylene acrylate.

8. The food package according to Claim 1, further comprising a barrier layer located between the base layer and the adhesive layer.

9. The food package according to Claim 8, wherein the barrier layer comprises a material selected from the group consisting of metal foil and filled or unfilled polyethylene terephthalate (PET), polybutylene terephthalate (PBT), ethylene vinyl alcohol (EVOH), polyethylene, polypropylene, nylon, metal foils, acrylonitrile-butadiene-styrene (ABS), polycarbonate, acrylonitrile copolymers, polystyrenes, and polyvinyl chloride.

10. The food package according to Claim 9, wherein the barrier layer comprises polyethylene terephthalate (PET).

11. A lid comprising a base layer and an adhesive layer, the adhesive layer being capable of heat sealing to the sealing rim of a container, maintaining a seal with the sealing rim of the container at temperatures below heating temperatures, and releasing the seal when subjected to heating temperatures.

12. The lid according to Claim 11, wherein the base layer comprises a material selected from the group consisting of paper, paperboard, plastic, metal, and combinations thereof.

13. The lid according to Claim 11, wherein the adhesive layer is capable of maintaining a seal with the sealing rim of the container at a temperature range from at least about -40 °F to about +150 °F.

14. The lid according to Claim 11, wherein the adhesive layer contains an adhesive selected from the group consisting of ethyl methyl acrylate, ethyl methyl acrylate with maleic anhydride, acid modified ethyl methyl acrylate, ethyl methyl acrylate with acid modified ethylene acrylate, ethylene-butyl-acrylate copolymer, modified polyethylene, and mixtures thereof.

15. The lid according to Claim 14, wherein the adhesive comprises EMA blended with acid-modified ethylene acrylate .

16. The lid according to Claim 15, wherein the adhesive comprises 80% EMA blended with 20% acid-modified ethylene acrylate.

17. The lid according to Claim 11, further comprising a barrier layer located between the base layer and the adhesive layer.

18. The lid according to Claim 17, wherein the barrier layer comprises a material selected from the group consisting of metal foil and filled or unfilled polyethylene terephthalate (PET), polybutylene terephthalate (PBT), ethylene vinyl alcohol (EVOH), polyethylene, polypropylene, nylon, metal foils, acrylonitrile-butadiene-styrene (ABS), polycarbonate, acrylonitrile copolymers, polystyrenes, and polyvinyl chloride.

19. The lid according to Claim 18, wherein the barrier layer comprises polyethylene terephthalate (PET).

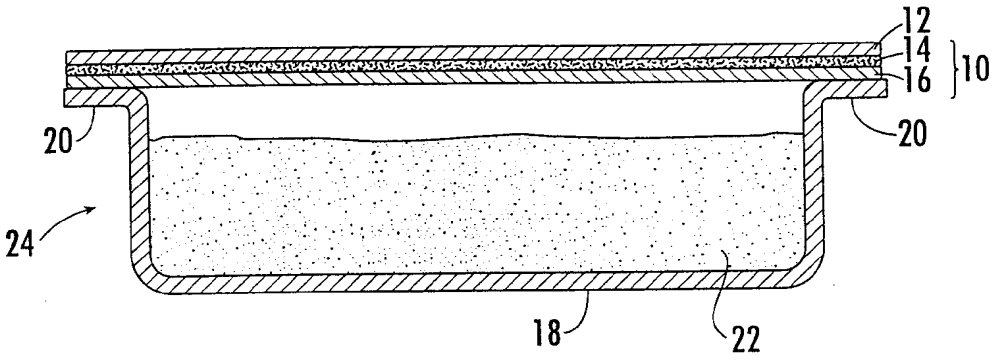

FIG. 1.

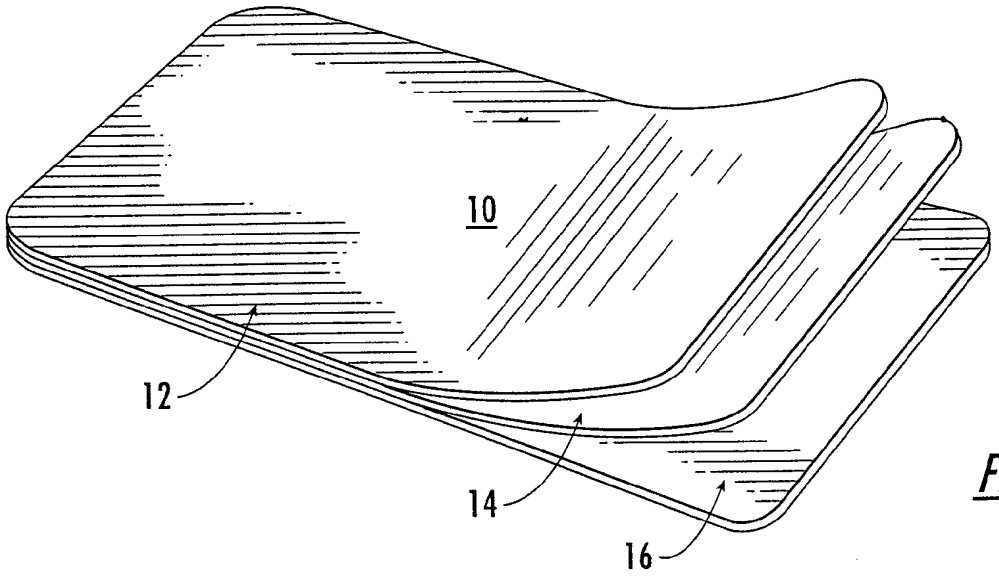

FIG. 2.

INTERNATIONAL SEARCH REPORT

Interi nal Application No
PCT/US 99/23427

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D77/20 B65D81/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 211 927 A (INT PAPER CO) 19 July 1974 (1974-07-19) page 3, line 31 - line 35 page 5, line 36 -page 6, line 15 page 7, line 21 -page 10, line 35; figures 1-4	1-4,8,9, 11-13, 17,18
X	EP 0 356 169 A (CAMPBELL SOUP CO) 28 February 1990 (1990-02-28) column 5, line 37 -column 6, line 3 column 10, line 40 - line 53; claims 1,2; figures 1-3	1-3,8,9, 11,12, 17,18
A	FR 2 481 677 A (METAL BOX CO LTD) 6 November 1981 (1981-11-06) claims 1,2; figures 1,2	1

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
20 January 2000	27/01/2000

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Interi nal Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 469 258 A (WRIGHT ROBERT V ET AL) 4 September 1984 (1984-09-04) claim 3; figure 1	5,14

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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Information on patent family members

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